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AIRPORT SHOP OPERATIONS



UNIVERSITY OF ILLINOIS INSTITUTE OF AVIATION URBANA

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by

LESLIE A. BRYAN

*Director, Institute of Aviation
University of Illinois*

AIRPORT SHOP OPERATIONS

PUBLISHED BY THE UNIVERSITY OF ILLINOIS, URBANA

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UNIVERSITY OF ILLINOIS

Foreword

The University of Illinois has been actively interested in aviation for a long period of time dating at least from World War I. During World War II that interest increased and culminated in the establishment of the Institute of Aviation in 1945 which, among its various activities, conducts aeronautical research, flight training, and subprofessional technical aviation courses for students of the University.

The Link Foundation, recognizing the pioneering experience of the Institute of Aviation, provided a grant to the University of Illinois Foundation for use by the Institute in order to prepare and publish information about its program believing that the compilation of this information might be valuable to other institutions and to other segments of the aviation industry considering the establishment of similar activities.

This bulletin, the fourth of five such publications, attempts to give the basic information necessary to organize and operate an aircraft repair and maintenance unit. Other bulletins published under The Link Foundation grant cover the organization of a college-level aircraft and engine maintenance curriculum, the operation of a university airport, including essential facts and figures about repair and maintenance services, the organization of an aviation ground school, and the organization of a flight training curriculum. While the aim has been to provide sources of general information, there is frequent reference to the operations of the aviation program of the University of Illinois for illustrative purposes.

In the preparation of the material for this bulletin, Mr. Forrest L. Lancaster, Aircraft Maintenance Engineer and Mr. N. C. Grimm, Supervising Engineer of the Institute of Aviation staff, have been most helpful.

In this monograph, as in all publications of the Institute, the author has had complete freedom to express his opinions, with the understanding that he will assume sole responsibility therefor.

LESLIE A. BRYAN, *Director*

December, 1954

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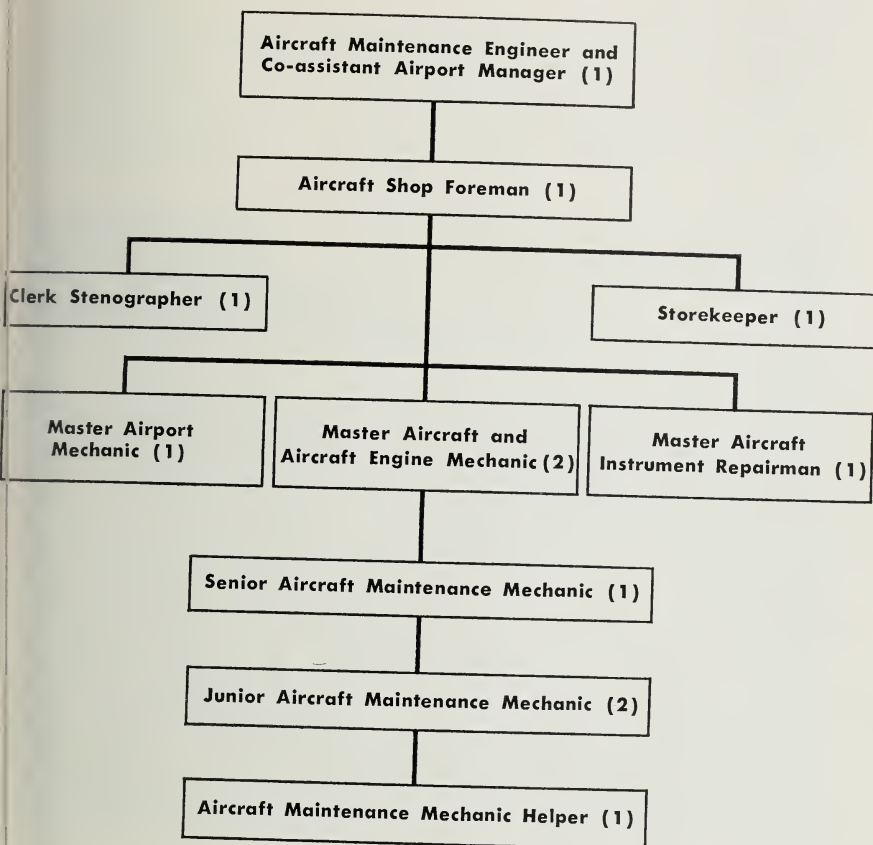
THE AIRCRAFT MAINTENANCE SHOP

ORGANIZATION

An aircraft maintenance shop, like the ground school and the flight activities, is a basic function of a complete university aviation program. Like the other activities it can start on a relatively small basis and can grow as needed.

At the University of Illinois, the Institute of Aviation operates a complete aircraft, engine, accessory, instrument, propeller, and radio repair shop. The shop is operated for the purpose of maintaining the University fleet of aircraft and offering repair and maintenance facilities for other aircraft based on the field and for transients who need emergency service. The University maintains the latter service as part of its agreement with the Federal government to operate a public airport in return for government aid in the construction of the airport. The aircraft maintenance department also operates a Civil Aeronautics Administration (C.A.A.) Approved Parachute Loft for inspection, repair, and repacking of all types of parachutes. A loft does not become economical until the volume of repacking exceeds six parachutes a day.

The following chart shows the present organization of the aircraft maintenance shop with the numbers indicating the number of employees in each classification:



SHOP APPROVAL

It is necessary to have Federal approval of the aircraft maintenance shop if full benefit is desired. The method of securing this approval and the requirements for the approval are outlined in detail in C.A.M. 52. This manual, entitled "Repair Station Certificates," can be purchased from the Superintendent of Documents, Washington 25, D.C., for \$1. It contains the general rules for certification, including the procedure for applying for a certificate, and the requirements for the particular ratings desired. It is wise to go over the provisions of the manual carefully and to consult with the C.A.A. representatives from the nearest local C.A.A. office. When that has been done the applicant then fills out form ACA-

394 which is provided by the C.A.A. district or regional office. The manual gives the location of offices.

THE APPLICATION FILE

The completed application file, in duplicate, consists of the following documents: the executed form ACA-394, a roster of the supervisory and inspection personnel, a copy of the repair station inspection manual, and a list of maintenance functions contracted to outside agencies. A copy of the Institute of Aviation's inspection manual is contained in Appendix A.

CERTIFICATE REQUIREMENTS

The C.A.A. will not issue a repair station certificate unless the inspecting agent finds that all the requirements of C.A.M. 52 have been complied with. However, peculiar circumstances may be taken into consideration and, if the standards are not lowered, a certificate may be granted with the limitations noted.

As far as housing and facilities are concerned, the C.A.A. will want to ascertain that working space, storage facilities, and parts protection are such that the work being accomplished is protected at all times from the elements. They will also check to see that the workers are so protected that they can perform their work adequately without impairment of quality and with proper facilities for the accomplishment of the maintenance operation. Ventilation, lighting, temperature control, and painting space will also be checked. Floor space may range from one hundred to several thousand square feet.

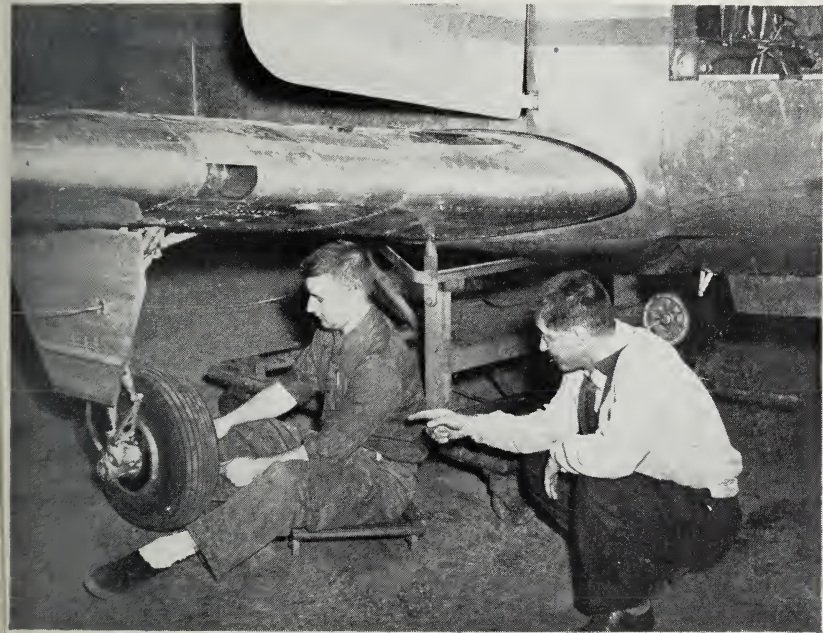
Special additional facilities are required for airframe, engine, propeller, instrument, accessory, and radio repair stations. These requirements are listed in Civil Aeronautics Manual (C.A.M.) 52. In general, the C.A.A. wants a responsible operation and will be most helpful in planning the station. At the inception of the operation the minimum requirements for the airframe and engine repair station will be sufficient to get under way. In fact, one licensed mechanic will be adequate to get a flight program going. Normally such a mechanic has his own hand tools. So a small investment in supplies, small machines, and test equipment will suffice until the organization develops. The investment can run from a few hundred dollars to many thousands.

In localities where there are specialized facilities, such as a plating company, available to the station, the C.A.A. will often permit a statement from the owners of the facilities to be substituted for the facilities required by Manual 52. Educational institutions can secure much specialized equipment through government surplus channels.

PERSONNEL

AIRCRAFT MAINTENANCE ENGINEER

The aircraft maintenance engineer, under administrative supervision, is responsible for the management and operation of the aircraft maintenance shop. His characteristic duties and responsibilities are to supervise the aircraft maintenance staff, organize aircraft maintenance and repair, maintain a satisfactory stockroom, be responsible for records and reports,



25, 50, 75, and 100 hour inspections are routine

check time cards and other records, supervise in-service trainees, recommend appointments to shop staff, and perform related duties as assigned. The minimum acceptable qualifications are administrative and supervisory ability, university graduation, C.A.A. aircraft and engine rating, C.A.A. private or commercial pilot rating, and five years of responsible and technical experience in aircraft and engine repair. The salary range for this position is \$5000-8000.

The aircraft maintenance engineer at the University of Illinois Airport is in charge of all aircraft maintenance activities and is directly responsible to the Director of the Institute of Aviation. He is a Civil Aeronautics Administration licensed aircraft and engine mechanic with

fourteen years of experience in the maintenance, inspection, and overhaul of aircraft, aircraft engines, and accessories. According to the C.A.A. Repair Station Approval No. 3708, the aircraft maintenance engineer is the manager, chief inspector, technical supervisor, and C.A.A.-designated maintenance representative.

AIRCRAFT SHOP FOREMAN

Under general supervision, the aircraft shop foreman supervises and is immediately responsible for the work of aircraft maintenance mechanics, airport mechanics, instrument repairmen, storekeepers, and other personnel in the aircraft maintenance shop. His characteristic duties and responsibilities are to assign and supervise regular work on aircraft and aircraft engines, conduct inspections, maintain safety practices, plan work flow, maintain time records, calculate costs, correlate stockroom activities, cooperate with teaching programs, and perform related duties as assigned. The minimum acceptable qualifications for a shop foreman are supervisory ability, high-school graduation, a currently valid C.A.A. aircraft and engine mechanic rating, and five years of experience in aircraft and engine maintenance. The salary ranges from \$4000-6000 annually.

At the University of Illinois Airport the aircraft shop foreman is a C.A.A. licensed aircraft and aircraft engine mechanic with fourteen years of experience in the maintenance, inspection, and overhaul of aircraft, aircraft engines, and accessories. In accordance with C.A.A. Repair Station Approval No. 3708, the aircraft shop foreman is an inspector, technical supervisor, and designated maintenance representative, and is in charge of the shop during the absence of the aircraft maintenance engineer.

MASTER AIRCRAFT AND AIRCRAFT ENGINE MECHANIC

The master aircraft and aircraft engine mechanic must be qualified to do precision work, under general supervision, requiring a high degree of mechanical skill in the development, building, maintenance, and repair of aircraft, aircraft engines, and component parts. His characteristic duties and responsibilities are to develop, design, and build aircraft and aircraft engines from blueprints and specifications, perform skilled mechanical work with fine tolerances, plan, assign, and oversee work of subordinates, be responsible for repairs, overhauls, and inspections of such aircraft and aircraft engines as may be assigned, assist in teaching when required, operate all types of testing devices, as well as all shop machinery, install and repair all types of aircraft accessories, and

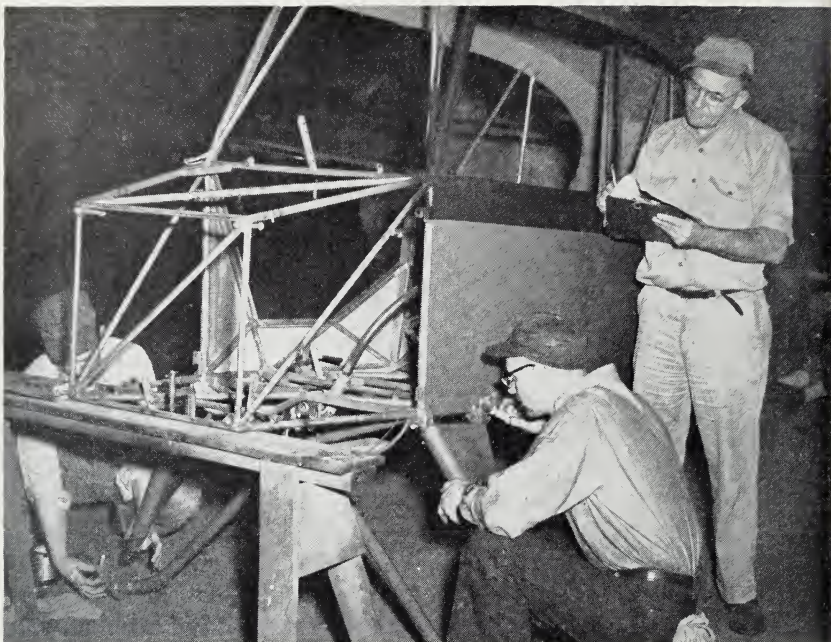
perform related duties as assigned. The minimum acceptable qualifications are knowledge of shop mathematics, precision tools, and special skills as required, supervisory ability, teaching ability, high-school graduation, currently valid C.A.A. aircraft and engine mechanic rating, and five years of experience in aircraft engine and aircraft instrument work. The salary range is \$4000-6000 annually.

At the University of Illinois master aircraft and aircraft engine mechanics are C.A.A. licensed aircraft and aircraft engine mechanics with from ten to fourteen years experience in the maintenance, inspection, and overhaul of aircraft, aircraft engines, and accessories. The master mechanics are required to have had at least seven years of experience, five of which must have been with the University of Illinois Institute of Aviation. They must be C.A.A. licensed mechanics and, in accordance with C.A.A. Repair Station Approval No. 3708, are also technical supervisors in charge of various intershop departments, such as engine overhaul, periodic inspection, fabrication, instruments and accessories, etc.

MASTER AIRCRAFT INSTRUMENT REPAIRMAN

The qualifications for the master aircraft instrument repairman are to perform duties, under general supervision, requiring a high degree of skill in the installation, maintenance, repair, and calibration of various aircraft instruments, including radio. His characteristic duties and responsibilities are to repair, calibrate, and adjust recording, regulating, and control instruments, such as compasses, altimeters, fuel gauges, tachometers, and similar instruments, install new or additional instruments, act as laboratory instructor in instrument uses, develop, design, and build experimental instruments, construct instruments from blueprints and specifications, perform precision lathe work, and perform related duties as assigned. The minimum acceptable qualifications are knowledge of shop mathematics and precision instruments, skill in the use of tools and equipment, five years of experience in the design, construction, repair, and adjustment of precision instruments, and high-school graduation. The salary ranges from \$4000-6000 annually.

The master aircraft instrument repairman and master airport mechanic have the same qualifications and responsibilities as the master aircraft and aircraft engine mechanic except that the master airport mechanic, being principally a machinist and welder, need not be a licensed C.A.A. mechanic. One of the master mechanics is also a master parachute rigger and has the additional responsibility of parachute inspections, maintenance, and repacking.



Aircraft maintenance personnel completely rebuild an airplane

MASTER AIRPORT MECHANIC

The qualifications for the master airport mechanic are to perform, under general supervision, duties requiring the high degree of skill involved in servicing, repairing, and altering airport machinery, buildings, and other physical facilities, and in the general maintenance, repair, or construction work at an airport. His characteristic duties and responsibilities are to check equipment for defects, repair motors, tractors, snow-removal equipment, trucks and buses, build special tools required for aircraft repair, build storage cabinets, make carpentry alterations, and perform related duties as assigned. The minimum acceptable qualifications are aptitude in automotive repair, machinist work, carpentry work, or other crafts, grade-school graduation, and five years of experience in general repair and maintenance work. The salary scale is \$4000-6000 annually.

SENIOR AIRCRAFT MAINTENANCE MECHANIC

The senior aircraft maintenance mechanic is a licensed C.A.A. aircraft and aircraft engine mechanic with seven years of experience in the inspection, maintenance, and overhaul of aircraft and aircraft engines.

In accordance with the C.A.A. Repair Station Approval No. 3708, he may also act as technical supervisor but with a lesser degree of freedom. The senior mechanic is required to have at least five years of experience as a C.A.A. licensed mechanic. His duties are identical to those of the master mechanic but to a lesser degree of responsibility, since he is not assigned to jobs requiring supervision over extensive major repairs and alterations.

The qualifications for this classification are to perform, under general supervision, responsible duties requiring a high degree of skill and experience in the maintenance and repair of aircraft, aircraft engines, and component parts. The characteristic duties and responsibilities are to supervise subordinates, be responsible for such repairs, overhauls, inspections, and work as may be assigned on aircraft and engines, operate drills, lathes, and testing devices, install aircraft and engine instruments, assist in teaching when required, flight test aircraft as required, and perform related duties as assigned. The minimum acceptable qualifications are supervisory ability, high-school graduation, currently valid C.A.A. aircraft and engine mechanic rating, and three years of experience in aircraft maintenance. The salary range is \$3500-5000 yearly.

JUNIOR AIRCRAFT MAINTENANCE MECHANIC

The junior aircraft maintenance mechanic is a C.A.A. licensed mechanic with one to five years of experience in the inspection, maintenance, and repair of aircraft and aircraft engines. He has no supervisory responsibilities and is required to carry out any and all duties within the scope of his trade and abilities as may be assigned by the shop foreman or any of the mechanics of higher classification to whom he may be assigned.

The qualifications for the junior aircraft maintenance mechanic are to perform duties, under general supervision, of considerable responsibility in maintaining aircraft and aircraft engines in an airworthy condition. The characteristic duties and responsibilities are to be responsible for the maintenance, overhaul, repair, construction, and inspection of aircraft engines, remove and install instruments, radios and accessories, supervise helpers, run inspections, aid in laboratory teaching, and perform related duties as assigned. The minimum acceptable qualifications are supervisory ability, high-school graduation, and a currently valid C.A.A. mechanic rating. The salary range is \$3000-4000 yearly.

AIRCRAFT MAINTENANCE MECHANIC HELPER

The aircraft maintenance mechanic helpers need not be C.A.A. licensed mechanics. The only qualifications required are an interest in aircraft mechanics and enough mechanical aptitude to assist in the maintenance of aircraft and aircraft engines. Washing, cleaning, and

waxing of the aircraft are the general assigned duties of the mechanic helper, but he is permitted and encouraged to do more as his ability progresses, and assistance is given to him so that he may eventually obtain the C.A.A. mechanic license.

The qualifications for the mechanic helper are, under direct supervision of authorized mechanics, to assist in performing duties involved in the maintenance of aircraft and aircraft engines. The characteristic duties and responsibilities are to aid in the maintenance, overhaul, repair, and construction of aircraft and aircraft engines, help with the repair and installation of aircraft instruments, assist in servicing aircraft, aid in inspection and cleaning of aircraft, and to perform related duties as assigned. The minimum acceptable qualifications are mechanical aptitude, manual dexterity, and high-school graduation. The salary range is \$2800-3500 yearly.

STOREKEEPER

The storekeeper's characteristic duties and responsibilities are to receive, store, and issue equipment, material, merchandise, or tools in a



The airport stockroom maintains necessary parts and replacements

stockroom or storeroom, check incoming orders against items listed on requisitions, invoices, or other proper forms, prepare preliminary forms for items that show shrinkage or damage and route to proper authority for action, count, grade, or weigh articles, store supplies in bins, on the floor, or on shelves, depending upon the nature of the articles, in a location and position convenient for removal when needed, assist in developing methods of moving the old stock before the new is issued, mark articles with identifying codes, figures, or letters when required, fill orders from requisitions or issue supplies and stock to students, faculty, and staff upon proper request or authority, make periodic inventory or keep a perpetual inventory of stock on hand, keep records of issuance of expendable or non-expendable items, request or order supplies when needed, make special purchases under authorized regulations, prepare necessary reports, make minor adjustments or repairs to articles carried in stock, mix or compound items carried in stock under the specific direction of an authorized person, assist the faculty or staff in setting up and operating items of equipment for lectures, regular laboratory work, or special demonstrations, and perform related duties as assigned. The minimum acceptable qualifications are high-school graduation and one year of experience in the field of storekeeping, accounting, or business administration. The salary ranges from \$3000-4000 annually.

CLERK-STENOGRAPHER

The clerk-stenographer works part time assisting the aircraft maintenance engineer in taking care of all aircraft records, work orders, purchase orders, a small amount of correspondence, and individual personnel records.

The qualifications and duties for this position are to be responsible, under general supervision, for the performance of difficult and responsible stenographic and clerical work requiring a thorough knowledge of aircraft maintenance procedures, records, problems, and policies. The characteristic duties and responsibilities are to maintain aircraft and aircraft maintenance records, logbooks, and ledgers, purchase order records, keep work order records on work done in the aircraft maintenance shop, keep personnel files, prepare payrolls, requisitions for the purchase of equipment and supplies, make insurance reports, compose routine correspondence, compile reports and statistics, answer inquiries, copy reports and manuscripts, and perform related duties as required. The minimum acceptable qualifications are high-school graduation, superior intelligence and clerical aptitude, mastery of typing and shorthand skills, tact and supervisory ability, pleasant but business-like personality, poise, and a minimum age of 21. The annual salary range is \$2000-3000.

Appendix A — An Inspection and Procedure Manual

INSPECTION PERSONNEL

The inspection personnel will be thoroughly familiar with all inspection methods, techniques, and equipment used in their specialty necessary to determine quality of airworthiness of the units and components undergoing repairs or alterations.

The shop foreman will maintain a complete file of aircraft specifications, Airworthiness Directives (A.D. Notes) and service bulletins which will be filed in the aircraft maintenance office and will be available to all authorized shop inspectors in the fulfillment of their inspection duties. A second set of aircraft specifications and engine service bulletins will be maintained by the master aircraft and aircraft engine mechanic in charge of engine overhaul and will be filed in the engine accessory room.

The aircraft maintenance engineer and the shop foreman will maintain a file, in the office, of all technical reference material as well as a library of various types and models of aircraft and aircraft engine maintenance and overhaul manuals, parts manuals, and price lists. These will all be available for use by all authorized inspectors and technical supervisors.

Magnaflux and black-light inspections will be performed only by those inspectors or technical supervisors experienced with magnaflux operation. The master mechanic in charge of engine overhaul will be responsible for the maintenance of the magnaflux and for checking out any inspector so designated by the aircraft maintenance engineer on the proper operation of the magnaflux machine and its accessories. At least one qualified person will be employed at all times proficient in the use of magnetic and fluorescent inspection equipment.

Magnifying glasses, micrometers, dial indicators, and other inspection aids are available from the stockroom. Malfunctioning of any inspection equipment will be reported to the shop foreman or aircraft maintenance engineer who will in turn see that the equipment is satisfactorily repaired, recalibrated, or replaced by new equipment. All test equipment will be tested and recalibrated as per manufacturers' recommendations and records of these inspections will be maintained by each individual department.

The chief inspector and/or alternate inspector will be responsible for the approval of all major repairs and major alterations, on form ACA-337, and the inspection and approval of annual inspections, including issuance of form ACA-1362, Airworthiness Certificate, on all aircraft within the limits of this repair station approval.

INSPECTION OF INCOMING MATERIAL

The storekeeper will be responsible for unpacking and checking all incoming material as to condition and quantity as indicated by the packing slip and University of Illinois receiving report. Questionable material will be brought to the attention of the aircraft maintenance engineer. The chief inspector or alternate inspector will ascertain the airworthiness condition of all incoming stock prior to its being put in the bins available for use.

All material in the stockroom and reserve storage room will be tagged by manufacturer's part number or binned, in which case the bin will be labeled by part number. Insofar as possible all stock bins are labeled in sequence by manufacturer's number which tends automatically to locate parts in easy-to-find locations and tends to keep all Aeronca parts together as well as Continental engine parts, Cessna parts, Beechcraft parts, and so forth.

All parts and stock in the stockroom will be serviceable. Unserviceable stock will be disposed of upon authorization of the shop foreman or aircraft maintenance engineer, and repairable items will be repaired or completely overhauled prior to returning to stockroom for reissue. Obsolete stock will be surveyed and removed from stock immediately upon notice of obsolescence.

PRELIMINARY INSPECTION

Preliminary inspections will be made by the aircraft maintenance engineer or the shop foreman and the results listed on the shop work order for item concerned. Master mechanics as well as the shop foreman will continually inspect work being done by other mechanics not designated as inspectors. All work orders, upon completion of work, must be signed by the inspector making the final inspection, and various jobs performed are to be initialed by the mechanic who actually performed the work.

INSPECTION FOR HIDDEN DAMAGE

Inspection for hidden damage will be performed by the shop foreman or master aircraft and aircraft engine mechanic or the aircraft maintenance engineer. These inspections will be mandatory on engine and accessory overhaul and on all 100-hour as well as annual inspections. It will also be mandatory when specified by service bulletins or A. D. notes.

Inspections for hidden damage in the case of engine and accessory overhaul will be by magnaflux and black-light. Other steel parts remov-

able for magnaflux or black-light inspection will be so inspected as required by service bulletins or A. D. notes. Other inspections will be made by the aid of 10-power magnifying glass when applicable, otherwise by close visual inspection.

INSPECTION PROCEDURE MANUAL

The aircraft maintenance engineer will be responsible for the continued review and correction of the inspection manual to keep it adequate for the functions or services performed by the repair station. When corrections or supplements are added to the inspection manual a copy will be furnished to each employee of the repair station and one copy posted on the bulletin board by the stockroom window.

All employees will be furnished with a copy of the repair station inspection manual, and new employees will receive a copy upon employment.

The aircraft maintenance engineer is the manager of the C.A.A. repair station and is also the chief inspector. The shop foreman is an inspector and will assume the duties of the chief inspector when the chief inspector is absent.

The line of authority within the aircraft maintenance department will be as follows:

1. Director of Institute of Aviation
2. Aircraft maintenance engineer
3. Shop foreman
4. Master aircraft and aircraft engine mechanic
5. Senior aircraft maintenance mechanic
6. Junior aircraft maintenance mechanic
7. Aircraft maintenance mechanic helper

All work orders will be executed by the inspector or alternate inspector who will note the work to be performed and time the aircraft is desired for use by the owner. The number of the work order and the pertinent information is entered in the work order ledger and the work order given to the appropriate shop foreman who will assign mechanic or mechanics, as the job calls for, to perform the work designated on the work order. After the aircraft has been moved to the shop, the shop foreman, master or senior mechanic assigned to the work order will make his preliminary inspection, note results on the work order, or confirm the defects noted by the aircraft maintenance engineer. After completion of work, the work order will be signed by the employee (inspector) supervising or performing the work. The work order is then turned over to the shop foreman who returns it to the maintenance

office where it is processed and filed. All work orders and records will be filed and maintained for a period of at least two years.

The chief inspector or alternate inspector will make a final inspection of all major alterations and major repairs prior to approval and release for service. The chief inspector and alternate inspector are responsible for the approval of all annual inspections performed in the shop and are authorized and responsible for the issuance of airworthiness certificates, form ACA-1362, for all aircraft within the limits of this repair station approval.

Master and senior mechanics are also designated as technical supervisors and may pass inspection on work performed by the junior mechanics and mechanic helpers assigned to them as assistants. They also are authorized to sign repair station work orders.



The Radio and Instrument Laboratory is an integral part of aircraft maintenance operations

Appendix B — Equipment List

The Institute of Aviation Aircraft Maintenance equipment list now completely fulfills C.A.A. requirements. In the Civil Aeronautics Manual 52 some equipment is marked required, but other equipment is starred, which means that such equipment or service need only be available, e.g., a letter from the Danville Plating Company verifying their ability to do plating work. This may be done for any equipment or service listed in Manual 52, which is followed by an asterisk.

In the equipment list it should be noted that the same piece of equipment appears under several of the different classifications, e.g., an air compressor under equipment for steel structural components and for fabric covering. This does not mean two different air compressors and regulators are needed. The same is true of other equipment which may be used in different classifications of maintenance or repair work.

It is possible to list only the approximate cost of the equipment since a majority of the larger items were obtained through surplus or obtained new but with an educational discount.

The Institute of Aviation mechanics are required to furnish their own hand tools, but the Institute does furnish special tools such as micrometers, dial indicators, electric drills, etc.

The amount of stock necessary to obtain approval will be based on the size of operation which is established and the type of aircraft it is necessary to maintain.

REPAIR STATION EQUIPMENT LIST

R — Required Equipment

O — Optional Equipment

A — Available Equipment From Outside Source

AIRFRAME RATING Figures which appear in boldface type denote equipment which has been listed previously.

	R	O	A
1. Steel Structural Components			
1 Ea. — Arc Welder — Deluxe 200.....		250.00	
2 Ea. — Acetylene — Portable	75.00		
2 Ea. — Torch and set of tips (Smith)...	50.00		
3 Ea. — Benches with vise	75.00		
2 Ea. — Metal saw (Do-all and Delta)...	1950.00		

	R	O	A
1 Ea. — Grinder and buffer (Pedestal, bench, portable).	100.00		
Jigs and fixtures (Assortment of).	50.00		
Corrosion proofing equipment.	25.00		
Anodizing facilities			500.00
Metal Plating facilities.			500.00
Steam Cleaning Equipment.			300.00
2 Ea. — Pressure pots (Paint and dope).	200.00		
2 Ea. — Suction cups and gun heads.	50.00		
1 Ea. — Metal lathe (Sebastian 16 x 6 in.)	1500.00		
1 Ea. — Planer (Delta).			250.00
1 Ea. — Shaper (Stanley)			500.00
1 Ea. — Milling machine (Milwaukee model H).			1700.00
1 Ea. — Surface grinder (Norton).			500.00
2 Ea. — Drill press and assorted drills (Pedestal and bench).	200.00		
1 Ea. — Nibbler (Savage)	125.00		
Assorted hand tools (Special wrenches, reamers, taps, dies, etc.)	200.00		
2 Ea. — Sand blast units.			315.00
4 Ea. — Chemical cleaning tanks.			100.00
2 Ea. — Degreasing tanks.			100.00
1 Ea. — Heat treat oven.			400.00
1 Ea. — Magnaflux machine			1500.00
2 Ea. — Magnifying glasses.	10.00		
1 Ea. — Fluorescent inspection unit.			1000.00
2 Ea. — Compressor and regulators.	1700.00		
1 Ea. — Rockwell test unit.			500.00
1 Ea. — Brinell test unit.			500.00
2. Wood Structures			
Hand saws, planes, and chisels (Assortment of each).	50.00		
1 Ea. — Miter saw.	40.00		
1 Ea. — Table saw (Delta).	110.00		
1 Ea. — Band saw (Delta).	150.00		
1 Ea. — Sander (Disc, belt, and vibrator)	150.00		
1 Ea. — Thickness planer (Delta).			250.00
2 Ea. — Drill press (Delta).	50.00		
1 Set — Brace and bit.	25.00		

	R	O	A
2 Ea. — Riveting equipment (Complete sets)	25.00		
1 Ea. — Planer-joiner (Delta)			115.00
1 Ea. — Router (Stanley)			35.00
1 Ea. — Carpenter square	5.00		
2 Ea. — Trammels (Two sets of points and assortment of bars)	5.00		
Cabinet maker clamps (Assortment of each type)	15.00		
10 Ea. — Sand and shot bags	10.00		
Paint brushes (Assortment of)	25.00		
3. Alloy skin and structural components			
1 Set — Smoothing dollies (Complete set)	50.00		
1 Set — Bucking bars (Complete assortment)	25.00		
1 Ea. — Metal rolls and dies (30" Pexto slip rolls)	75.00		
1 Ea. — Nibbler (Savage)	125.00		
1 Ea. — Metal brake (Box and cornice) . .	560.00		
1 Ea. — Metal shear (Open and closed throat)	850.00		
✓ 1 Ea. — Do-all (Completely equipped) . .			1950.00
2 Ea. — Hand drill (Powered) and assorted drills	35.00		
2 Ea. — Drill press (Delta)	200.00		
2 Ea. — Planishing iron			100.00
Jigs (As required)	25.00		
Fixtures and clamps (Complete assortment)	25.00		
2 Ea. — Riveting equipment powered (and also two cherry rivet guns, two squeeze riveters)	150.00		
Clecos and similar fastners (Assortment of each)			
1 Ea. — Rivet oven (As required)	150.00		
1 Ea. — Cold storage box (As required) .	150.00		
1 Ea. — Fluorescent inspection unit			1000.00
4. Fabric covering			
Assorted needles (Straight and curved)	10.00		

	R	O	A
1 Ea. — Sewing machine (Single and double needle)			365.00
1 Ea. — Fabric table	50.00		
2 Ea. — Pinking shears	10.00		
Clamp and pins (Assortment of each)	10.00		
✓ Paint brushes (Assortment of) . .	25.00		
✓ Dope spraying equipment (Two pressure pots and 2 suction cups and gun heads)	50.00		
Spray booth (39' x 32' steel structure, exhaust fan, heated air manifold, four air regulators)	500.00		
1 Set — Number and letter templates . .	60.00		
Plastic and upholstery repair equipment	5.00		
✓ Compressor and regulators (Two compressors and regulators) . .	1700.00		
Engraving equipment			350.00
5. Control systems			
1 Set — Splicing equipment (Clamps and awls)	5.00		
1 Set — Swaging equipment (Nicopress set)			25.00
2 Ea. — Tensiometer	10.00		
Cable stretching and testing equipment			500.00
1 Ea. — Bubble protractor	10.00		
Contour boards and templates (As required)	10.00		
1 Ea. — Bench arbor press	40.00		
Control Balancing Jigs (As required)	10.00		
Hinge and bushing repair equipment	50.00		
2 Ea. — Drill press (Reamers and drills) ✓ Delta	200.00		
1 Ea. — Lathe (South Bend 10")			350.00

	R	O	A
6. Landing gear systems			
Aircraft jacks and pads (Six large and six small and two DC-3 wing jacks)	500.00		
1 Ea. — Heating torch and oven	225.00		
1 Ea. — Arbor press	40.00		
Bungee jigs and servicing tools	10.00		
Special tools (Reamers, drills, etc.)	100.00		
Anodizing and plating equipment			1000.00
2 Ea. — Drill press (Delta)	200.00		
1 Ea. — Brake drum turning lathe (Sebastian 14")			1500.00
Brake shoe riveting equipment			25.00
1 Ea. — Work stands and fixtures	150.00		
Machine shop equipment (for hydraulic accessory overhaul)			
1 Ea. — Hydraulic pressure test unit	500.00		
Tube fabrication equipment (Bending, flaring, and beading kits)	50.00		
Tire tools (Assortment, including hydraulic bead breaker)	50.00		
2 Ea. — Voltohmeter	35.00		
1 Ea. — Wire striper	5.00		
1 Ea. — Stakon equipment (Complete set)	40.00		
Soldering equipment (Irons, guns, and torch)	30.00		
Electric motor test equipment	50.00		
7. Electric wiring			
2 Ea. — Voltohmeter	35.00		
Soldering equipment	30.00		
Electric power supply	Local Service		
Conduit fabrication tools	50.00		
8. Assembly operations			
Racks and cradles (Adequate assortment)	100.00		
2 Ea. — Plumb bobs	2.00		
2 Ea. — Levels	5.00		
Profile boards	5.00		
Straight edge	1.00		

	R	O	A
2 Ea. — Combination square and bubble protractor.	12.00		
2 Ea. — Chain hoist and bridle.	70.00		
Engine stands (Assortment). . . .	150.00		
2 Ea. — Tensiometers.	10.00		
Aircraft jacks and pads (6 large, 6 small, and 2 DC-3 wing jacks, hydraulic operated). . .	500.00		
Jigs and fixtures as required. . .	100.00		
Scales for weighing (Platform and Cox and Stevens elec- tronic).	1000.00		
8 Ea. — Work benches	75.00		
8 Ea. — Wing stands.	100.00		
8 Ea. — Wing racks	100.00		
Fuselage cradles (Assortment). .	100.00		
Lubrication equipment (Complete assortment of guns, etc.). . . .	100.00		
Auxiliary aircraft power supply (12 and 24 volt).	350.00		
1 Ea. — Vacuum cleaner.			175.00
Aircraft ground handling gear. .			1000.00
2 Ea. — Steel tape (50 ft. tapes).	5.00		

POWERPLANT RATING Figures which appear in boldface type denote equipment which has been listed previously.

	R	O	A
1. Maintain, repair, and alter powerplants, including replacement of parts			
Mechanical cleaning	5.00		
2 Ea. — Degreasing & chemical cleaning booths	200.00		
1 Ea. — Heating torch	75.00		
1 Ea. — Oil bath	150.00		
Chilling — shrinking facilities . . .	150.00		
2 Ea. — Abrasive air blast units	315.00		
Valve guide mandrels	25.00		
Valve seat insert mandrels	25.00		
1 Ea. — Arbor press	40.00		
1 Ea. — Grinder and buffer (Bench & portable)	100.00		
Metal plating facilities			500.00
Tap and dies (Assortment of) . . .	100.00		
Reamers and broaches (Assortment)	500.00		
Counterbores (Assortment)	25.00		
1 Ea. — Oven (Temperature control) . . .	150.00		
Special engine tools (Continental, Lycoming, Franklin, Wright and Pratt & Whitney)	750.00		
Paint spraying equipment (2 pots & 2 guns)	250.00		
1 Ea. — Air & Electric drill motors	75.00		
Thread chasers (Assortment)	25.00		
Assorted drill	50.00		
Heliocoil equipment	150.00		
2 Sets — Easy outs	25.00		
Forming tools (Hand)			50.00
1 Set — Riveting equipment (Hand)			25.00
Engraving equipment			350.00
1 Ea. — Metal stamping set (Letters & figures)	60.00		
Plating facilities			500.00

	R	O	A
2. Inspection of parts, using appropriate inspection aids			
1 Ea. — Magnaflux machine	1500.00		
1 Ea. — Fluorescent inspection unit	100.00		
1 Ea. — Dial gauge	25.00		
1 Set — Inside & outside micrometer	75.00		
2 Ea. — Magnifying glasses	10.00		
1 Ea. — Torque wrench	15.00		
1 Set — Feeler gauge	3.00		
1 Set — Height gauges	65.00		
1 Ea. — Surface plate	75.00		
1 Set — V blocks	10.00		
Jigs and fixtures	100.00		
Parallel blocks	15.00		
1 Set — Telescoping gauges	20.00		
1 Set — Radius gauges	10.00		
Inspection bench & parts rack	250.00		
1 Ea. — Valve spring compression gauge	55.00		
1 Ea. — Combination square	12.50		
3. Accomplish routine machine work			
1 Ea. — Honing and lapping equipment			150.00
1 Ea. — Precision grinder			150.00
1 Ea. — Lathe (Sheldon 56" bed)	350.00		
1 Ea. — Portable grinder	75.00		
1 Ea. — Drill press (Delta)	200.00		
1 Ea. — Milling machine (Vertical)			
Milwaukee			1700.00
Drills, taps, dies, and boring tools (Assortment)	200.00		
Reamers and broaches (Assortment)	200.00		
Buffing and cleaning wheels	150.00		
Valve grinding & lapping equipment	400.00		
Valve seat grinding & lapping equipment	700.00		
4. Performing assembly operations			
Valve and ignition timing tools	50.00		

	R	O	A
1 Ea. — High tension ignition harness tester	60.00		
Ignition harness fabrication tools	25.00		
Fuel and oil line fabrication and test equipment	25.00		
Soldering irons and low pressure torch	30.00		
Propeller installation tools	150.00		
Engine accessory test equipment (Allen Test Stand).	1021.00		
Engine stands (Assortment). . . .	300.00		
Hoisting equipment (Three chain hoist).	150.00		
5. Test overhauled powerplants in compliance with manufacturer's recommendations			
2 Ea. — Test stand (Portable).			200.00
2 Ea. — Test clubs			200.00

PROPELLER RATING Figures which appear in boldface type denote equipment which has been listed previously.

	R	O	A
1. Maintain, repair, and alter propellers, including installation and replacement of parts			
Metal fabrication tools (Hand)			
2 Ea. — Power driven hand drills.	35.00		
1 Ea. — Sander (Disc, belt, and vibrator type).	150.00		
2 Ea. — Drill press (Delta).		200.00	
1 Ea. — Planer-joiner (Delta).		115.00	
1 Ea. — Milling machine (Vertical)			
Milwaukee	1700.00		
Soldering equipment (Irons, guns & torch)	30.00		
1 Ea. — Table saw (Delta).	110.00		
1 Ea. — Band saw (Delta).	150.00		
Assorted clamps	100.00		
1 Ea. — Grinder & buffer (Portable & bench mounted)	75.00		
Prop tools (Special as recommended by manufacturers). . .	125.00		
Paint spray equipment (Including compressor & regulators). . .	1800.00		
Chemical cleaning		200.00	
1 Ea. — Chain hoist & assortment of propeller bridles	150.00		
Metal plating			500.00
Assortment of propeller racks & stands	250.00		
1 Ea. — Portable grinder & buffer.	75.00		
Propeller lubricating equipment.	25.00		
1 Ea. — Torque wrench	17.50		
1 Ea. — Spring scales for checking torque	5.00		
2 Sets — Blade turning bars.	20.00		

	R	O	A
2. Inspection components, using appropriate aids			
1 Ea. — Surface table	600.00		
Assortment of propeller mandrels	300.00		
2 Ea. — Propeller protractor	25.00		
1 Ea. — Magnaflux machine (Long Bed).			1 000.00
1 Ea. — Fluorescent inspection unit.			500.00
2 Ea. — Magnifying glasses	10.00		
Etching equipment	50.00		
Propeller spline, "go" and "no go" gauges	50.00		
Assortment of thread & plug gauges.	50.00		
1 Set — Height gauges	65.00		
1 Set — Feeler gauges	3.00		
1 Ea. — Dial indicator	25.00		
1 Set — Inside & outside micrometers.	75.00		
1 Ea. — Combination square	12.50		
Assortment of stencils.	50.00		
1 Set — Metal stamps (Letters & numbers)	60.00		
3. Repair or replace component parts			
2 Ea. — Voltmeters	35.00		
4. Balance propellers			
1 Ea. — Balance stand and assortment of mandrels	300.00		
5. Test the propeller pitch changing mechanisms			
1 Ea. — Hydraulic test bench.	500.00		
1 Ea. — Electrical test bench.	350.00		
1 Ea. — Propeller governor test — hydraulic			500.00
1 Ea. — Propeller governor test — electrical			500.00

RADIO RATING Figures which appear in boldface type denote equipment which has been listed previously.

	R	O	A
1. Diagnose radio malfunctions (See 3 below)			
2. Maintain, repair, and alter radios, including installation and replacement of parts			
1 Ea. — Metal lathe			350.00
1 Ea. — Mica undercutter			75.00
Assortment of gear and bearing pullers			75.00
1 Ea. — Arbor press			40.00
1 Ea. — Dial motor test stand			
Paint & spray equipment (Pressure pot and suction cup). . . .			1800.00
Spray booth			500.00
1 Ea. — Oven			150.00
1 Set — Metal stamping tools (Letters & numbers).	60.00		
Engraving equipment			350.00
Drawing equipment			25.00
1 Ea. — Drill press (Delta).	75.00		
Hand tools (Complete assortment)	50.00		
Work benches & shop furniture.	300.00		
Sheet metal tools (Complete metal shop)			2500.00
3. Inspect and test radios			
AC power supply	Local Supply		
DC power supply	170.00		
2 Ea. — Voltmeters	35.00		
2 Ea. — Ohmmeters	35.00		
2 Ea. — Ammeters	35.00		
1 Ea. — Frequency meter (Miller absorption meter)	65.00		
1 Ea. — Multi test set	35.00		
1 Ea. — Megger	200.00		
1 Ea. — Signal generator (A.M. Hickok 288x)	320.00		
1 Ea. — V.H.F. signal generator (precision E400)	104.00		

	R	O	A
1 Ea. — Audio oscillator	30.00		
1 Ea. — Output power meter	35.00		
1 Ea. — Tube tester (Hickok)	155.00		
1 Ea. — Vacuum tube voltmeter (EV 10A) precision)	75.00		
Dummy antenna (Assortment) . . .	15.00		
Standard test antennas (Assortment)	50.00		
Microphone and headset tester .	50.00		
1 Ea. — Condenser tester	65.00		
Shielded room (10 ft. by 8 ft.) . .	500.00		
1 Ea. — VOR test set (Omni T-3)	500.00		
1 Ea. — Oscilloscope (Precision 500A) . .	135.00		
4. Make frequency checks (See above)			
5. Perform such calibrations as necessary for the proper operation of radios (See above)			

INSTRUMENT RATING Figures which appear in boldface type denote equipment which has been listed previously.

	R	O	A
1. Diagnose instrument malfunctions (Use item 3 below)			
2. Maintain, repair, and alter instruments, including installation and replacement of parts			
1 Ea. — Precision drill press	200.00		
1 Ea. — Precision lathe (South Bend) . . .	350.00		
1 Ea. — Bench arbor press	40.00		
1 Set — Hand lifters	5.00		
Assorted special wrenches and adapters	50.00		
Assorted special screw drivers . .	15.00		
Punches (Assortment)	25.00		
Broaches (Assortment)	65.00		
Bell jars (Assortment)	50.00		
1 Ea. — Staking set	40.00		
1 Ea. — Machinist vise	25.00		
Soldering irons (Assortment) . . .	30.00		
1 Ea. — Surface plate	75.00		
1 Set — Inside & outside micrometers . .	75.00		
1 Ea. — Surface gauge	12.00		
1 Ea. — Steel scale & combination square	12.50		
2 Sets — Dividers	3.00		
1 Ea. — Dial indicator	25.00		
Assorted files, taps, drills, dies & reamers	75.00		
Storage cabinets and complete stockroom	300.00		
1 Ea. — Cleaning unit	75.00		
2 Ea. — Stools	15.00		
Engraving equipment			350.00
Paint spraying equipment includ- ing compressors and regulators	1800.00		
Spray booth	500.00		
Grinder (Portable, large, & small)	200.00		
Magnet keeper (Assortment) . .	10.00		

	R	O	A
Appropriate fixtures and assembly stands	300.00		
Work benches	75.00		
Lubricants	15.00		
Liquids & supplies (Naphtha, compass liquid, sealing compounds, pit wood)	15.00		
3. Inspect, test, and calibrate instruments			
1 Ea. — Water and mercury manometers .	120.00		
Rubber tubing (Assortment)	20.00		
2 Ea. — Vacuum and air pressure supply source	1800.00		
1 Ea. — Pressure chamber	50.00		
1 Ea. — Dead weight tester	75.00		
1 Ea. — Calibration vibrator	150.00		
1 Ea. — Temperature chamber	250.00		
1 Ea. — Barometer, mercurial	300.00		
1 Ea. — Stroboscope	135.00		
1 Ea. — Tachometer test stand & variable speed motor	350.00		
1 Ea. — Wheatstone bridge	135.00		
1 Ea. — Magnet charger	170.00		
1 Ea. — Demagnetizer	50.00		
1 Ea. — Pelorus & compass rose	50.00		
1 Ea. — Thermometer, laboratory type . .	25.00		
1 Ea. — Stop watch & clock	50.00		
1 Ea. — Tilting compass turntable	150.00		
1 Ea. — Decade box (Resistance, capacitance)	25.00		
2 Ea. — Millivoltmeter — DC	35.00		
1 Ea. — Autosyn test stand and power supply	50.00		
1 Ea. — Selsyn test stand and power supply	50.00		
1 Ea. — Magnesyn test stand and power supply	50.00		
1 Ea. — High Potential tester	35.00		
Shunts (Assortment)	15.00		
1 Ea. — Null balance potentiometer . . .	35.00		
2 Ea. — Milliammeter AC 7 DC tester . .	35.00		
1 Ea. — Vacuum tube voltmeter	65.00		

	R	O	A
1 Ea. — Battery charger	60.00		
✓ Voltmeters (Assortment)	35.00		
Bank & turntable	150.00		
1 Ea. — Gyro rotor balance stand			1000.00
1 Set — Gyro fixtures (Sperry)	1500.00		
1 Ea. — Air-flow meter	50.00		
1 Ea. — Air filter & moisture trap	20.00		
1 Ea. — Oscilloscope	135.00		
2 Ea. — Signal generators	320.00		
1 Ea. — Frequency meter (Miller absorption)	65.00		
1 Ea. — Tube tester	155.00		
1 Ea. — Compass card balance fixture . .	25.00		

	R	O	A
1. Diagnose accessory malfunctions (See item 3 below)			
2. Maintain, repair, and alter accessories, including installation and the replacement of parts			
1 Ea. — Precision drill press	200.00		
1 Ea. — Metal lathe (South Bend)	350.00		
1 Ea. — Mica undercutter	75.00		
Gear and bearing pullers (Assortment)	150.00		
1 Ea. — Magnet charger	170.00		
1 Ea. — Arbor press	40.00		
Cleaning facilities	100.00		
Paint spraying facilities, including compressor and regulators . . .	1800.00		
1 Ea. — Grinder and buffer	75.00		
Tape and dies (Assortment) . . .	100.00		
Reamers (Assortment)	100.00		
Special accessory tools (Generators, magneto, starter, carburetor, and voltage regulators)	200.00		
Lubricants	15.00		
2 Sets — Easy outs	25.00		
Engraving equipment			350.00
Soldering equipment (Guns, irons, and torch)	30.00		
1 Ea. — Surface plate	75.00		
1 Ea. — Volt milliammeter	35.00		
Thread & plug gauges (Assortment)	50.00		
1 Ea. — Air & electric drill motor	35.00		
Battery charger and battery service equipment	100.00		
Work benches, racks, and storage cabinets & vises	200.00		
3. Inspect, test, and calibrate accessories			
1 Ea. — Surface plate	75.00		
1 Ea. — Magnet charger	170.00		

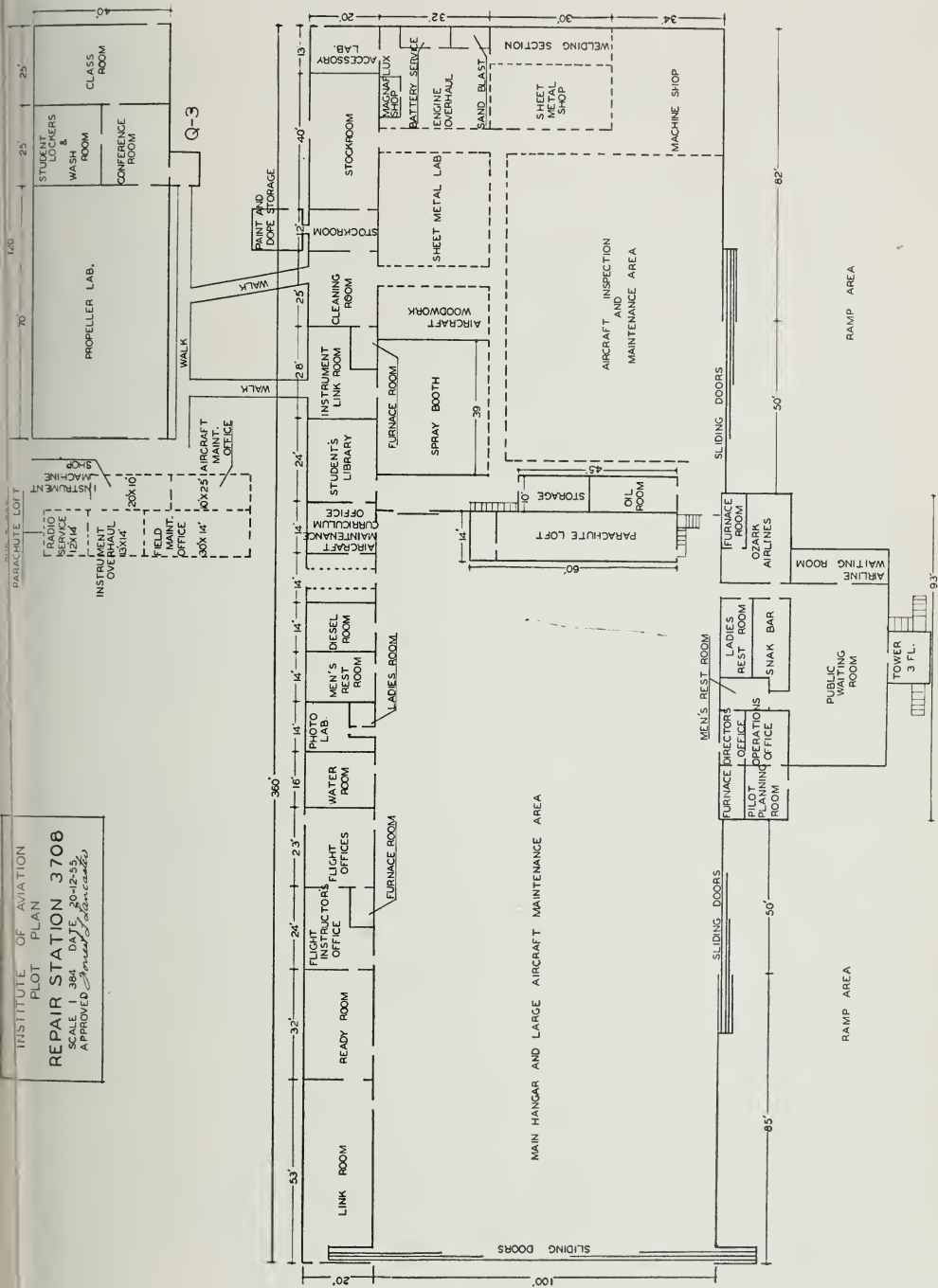
	R	O	A
1 Ea. — Magnaflux machine and demagnetizer	1 500.00		
2 Ea. — Magnifying glasses	10.00		
1 Ea. — Growler	50.00		
1 Ea. — Megger	200.00		
1 Ea. — Coil tester	65.00		
1 Ea. — Condenser tester	65.00		
1 Ea. — Accessory test stand (Allen)	1 021.00		
1 Ea. — Spark plug tester	50.00		
1 Ea. — High tension ignition harness tester	60.00		
1 Ea. — Carburetor flow bench		1 500.00	
1 Ea. — Float type carburetor bench	150.00		
1 Ea. — Dial gauge	25.00		
1 Set — Height gauges	65.00		
1 Set — Telescoping gauges	20.00		
1 Set — Inside & outside micrometers . . .	75.00		
1 Ea. — Combination square	12.50		
2 Ea. — Levels	5.00		
1 Ea. — Surface gauge	12.00		
1 Ea. — Volt — Ohm — Milliammeter	35.00		
1 Ea. — Frequency meter	60.00		
1 Ea. — Oscilloscope	135.00		
2 Ea. — Signal generator	320.00		
1 Ea. — Tube tester	155.00		
1 Ea. — AC power supply	Local Supply		
1 Ea. — DC power supply	170.00		

TOTALS

The following totals list the estimated costs for the required, optional, and available equipment for the six individual ratings starting with the airframe. Since it is possible to use some of the equipment for more than one rating, the table indicates the decreasing cost totals as the additional ratings are added, e.g., the estimated cost of required equipment for the Accessories Rating alone is \$8430, but the cost is only \$300 if it is added to the other five ratings.

Rating	Estimated Costs for Required Equipment for Indi- vidual Rating	Estimated Costs for Required Equipment for Six Ratings	Estimated Costs for Optional Equipment	Estimated Costs for Available Equipment for Indi- vidual Rating	Estimated Costs for Available Equipment for Six Ratings
Airframe	\$13,240.00	\$13,240.00	\$ 250.00	\$12,955.00	\$12,955.00
Powerplant	9,671.50	8,066.50	.....	3,825.00	700.00
Propeller	7,378.00	4,160.00	515.00	3,000.00	.....
Radio	3,094.00	2,434.00	.....	5,865.00	.....
Instrument	11,282.50	5,192.00	.....	1,350.00	1,000.00
Accessories	8,430.00	300.00	.....	1,850.00	.....

INSTITUTE OF AVIATION
PLOT PLAN
REPAIR STATION 3708
SCALE 1/8" = 1' DATE 20-12-53
APPROVED *Small Document*



Appendix C — Aircraft Maintenance Forms and Their Uses

Following is a brief explanation of the forms used by the Aircraft Maintenance Department and samples of these forms.

FORM NO. AMO 19

This form is the standard work order used by the Aircraft Maintenance Department for all work performed in the shop or by the department. The form is issued by the Aircraft Maintenance Engineer who keeps a ledger of all work orders issued, date issued, job performed, date completed, material used, and labor charged. The work order is issued to the Shop Foreman who in turn assigns mechanics to the job. Upon completion of work, the work order is signed by the mechanic (Inspector) supervising or performing the work and returned to the Shop Foreman, who, if necessary, makes a final inspection prior to releasing the aircraft and then returns the work order to the office.

Material will not be issued from the stockroom for use on a job unless a work order is presented. The Storekeeper will then issue the material and list it on the work order by quantity and part number as well as by name. After return of work order to the office, the Cardex Clerk will price the material used and remove the used material from the perpetual Cardex. Labor charge is made according to hours indicated on the work order, and a cash or charge sales ticket is then made up. Work order ledger entries are then completed and the work order filed except in case of University Aircraft work order, in which case entries are made in the University Aircraft Maintenance Ledger prior to filing of the work order.

[illegible]

Aviation oil supply is controlled by the Aircraft Maintenance Department and a clipboard with Form No. AMO 29 is maintained in the oil room. All oil removed from the drums must be entered on this form. This form is used by Cardex Clerk in maintaining the perpetual inventory of oil supply on hand and a record of where the oil is used.

UNIVERSITY OF ILLINOIS INSTITUTE OF AVIATION

DAILY AVIATION OIL SHEET

Date _____

ISSUED TO LINEMEN

1065	1080	1100	1120	ACCEPTED BY

USED IN THE SHOP

1065	1080	1100	1120	WORK ORDER & NC NO.	BY WHOM

SUMMARY

AMOUNT ON HAND AT BEGINNING OF DAY

AMOUNT PURCHASED

TOTAL AMOUNTS ISSUED OR USED

BALANCE ON HAND AT END OF DAY

PHYSICAL INVENTORY

1065	1080	1100	1120	TOTAL

FORM NO. AMO 23

No material is to be issued from the Stockroom without a work order which will indicate where the material is used and by whom. In the case of shop overhead maintenance, work and material used by other departments within the Institute of Aviation, Form No. AMO 23, Stockroom Material Report, is used. Material issued in duplicate by way of this form must be initialed by the employee receiving the material. When the form is full, it is forwarded to the Maintenance Office, where the material will be priced and items removed from the Cardex. The form is issued in duplicate and after pricing is complete, both copies are forwarded to the individual department head for signature. The original is returned to the Maintenance Office where it is filed.

UNIVERSITY OF ILLINOIS INSTITUTE OF AERONAUTICS, U. OF I. AIRPORT

STOCKROOM MATERIAL REPORT

The following material has been issued to _____ Department
during the period _____ to _____.

QUANTITY	ARTICLE	UNIT COST	TOTAL	RECEIVED BY
	Total			

I have checked and approve the above list of material issued to my Department

Return original to Aircraft Maintenance Office. Carbon copy to be retained by Department.

Signature _____

FORM NO. FM 8

The Institute has continuous orders with several local companies and can also get material from other University Storerooms. When this is done, Form No. FM 8 is used, but material purchase authorization must be approved by the Aircraft Maintenance Engineer or Shop Foreman.

UNIVERSITY OF ILLINOIS INSTITUTE OF AVIATION

MATERIAL PURCHASE AUTHORIZATION

VENDOR _____

Please deliver the following material to _____

and charge to P.O. _____

Authorized by _____

Date _____

Department _____

FORM NO. AMO 30

This form (heading only shown) accompanies the Daily Flight Record Sheets to indicate to the Chief Pilot what airplanes are being withheld by the Maintenance Department and why.

UNIVERSITY OF ILLINOIS INSTITUTE OF AVIATION

DAILY FLIGHT RECORD SHEETS

for _____

PLANES NOT FLYABLE

REASON

FORM NO. AM 3

This form is used after all major repairs and 100 hr. inspections and is issued to the Flight Department by the Aircraft Maintenance Engineer or Shop Foreman as notice that the aircraft is ready for test hop and must be test hopped prior to release for flight training or charter use.

UNIVERSITY OF ILLINOIS INSTITUTE OF AERONAUTICS

AIRCRAFT MAINTENANCE DEPARTMENT

NOTICE FOR TEST HOP

Aircraft Model and Make _____ NC Number _____

Date _____ Time _____ Released By (Foreman or Inspector) _____

Reason for Test Hop _____

Items to Be Checked _____

FLIGHT DEPARTMENT

Pilot _____ Time Up _____ Time Down _____ Date _____

Pilot's Report on the Flight _____

FORM NO. AM 1

This form is used by the Flight Department to indicate malfunctions of all types. When maintenance needed is of very minor nature, it is remedied by a line mechanic without grounding of the aircraft, but when it is necessary to bring the aircraft to the shop for inspection or repair, the pilot brings the Daily Flight Record Sheet along with Form No. AM 1 to the Aircraft Maintenance Office where the aircraft is officially grounded and a regular work order issued to cover the complaint or complaints noted. The aircraft remains grounded until the work order is officially completed.

UNIVERSITY OF ILLINOIS INSTITUTE OF AVIATION

MALFUNCTION REPORT

Aircraft Model & Make _____ NC Number _____ Date _____

The following defects were noted _____

By _____

Signature

FORM NO. ACA 337

This is the standard C.A.A. form which must be filled out when major repairs or alterations are made on a licensed aircraft and the repair or alteration approved by C.A.A. or representative prior to release of the aircraft involved.

U. S. DEPARTMENT OF COMMERCE CIVIL AERONAUTICS ADMINISTRATION				Form approved, Budget Bureau No. 41-R052.4.	
MAJOR REPAIR AND ALTERATION FORM (AIRFRAME, POWERPLANT, PROPELLER OR APPLIANCE)					
1. AIRCRAFT	MAKE	MODEL	SERIAL NO.	NATIONALITY AND REGISTRATION MARK	
2. OWNER	NAME (First, middle, last)		ADDRESS (Street and number, city, zone and State)		
3. COMPLETE ONLY FOR UNIT REPAIRED AND/OR ALTERED. DESCRIBE WORK ACCOMPLISHED ON REVERSE IN ACCORDANCE WITH CIVIL AERONAUTICS MANUAL 18.					
UNIT	MAKE	MODEL	SERIAL NO.	NATURE OF WORK (Check)	
				MAJOR REPAIR	MAJOR ALTERATION
a. AIRFRAME	***** (As described in item 1 above) *****				
b. POWERPLANT					
c. PROPELLER					
d. APPLIANCE	TYPE AND MANUFACTURER				
4. AIRCRAFT WEIGHT AND BALANCE DATA					
* AFTER the repairs and/or alterations described below were made.					
This item must be completed by repair or alteration agency. However, in the case of a spare component, it will not be completed until such component is installed in an aircraft. At this time, it will be completed by the installing agency, if applicable.					
CATEGORY	EMPTY WEIGHT (Pounds)*	EMPTY CENTER OF GRAVITY (Inches from datum)*		USEFUL LOAD (Pounds)*	
5. CONFORMITY STATEMENT (Complete and check)					
a. AGENCY'S NAME AND ADDRESS		b. KIND OF AGENCY		c. CERTIFICATE NO.	
		<input type="checkbox"/> U. S. Certificated Mechanic. <input type="checkbox"/> Foreign Certificated Mechanic. <input type="checkbox"/> Certificated Repair Station. <input type="checkbox"/> Manufacturer. <input type="checkbox"/> (Check if repair or alteration was made under delegation option procedures.)			
d. I certify that the repair and/or alteration made to the unit(s) identified under item 3 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 18 of the U. S. Civil Air Regulations and that the information furnished herein is true and correct to the best of my knowledge.					
<div style="display: flex; justify-content: space-between;"> (Date repair and/or alteration completed) (Signature of authorized individual) </div>					
6. APPROVAL FOR RETURN TO SERVICE (Check and complete appropriate items)					
Pursuant to the authority specified below the unit identified in item 3 was inspected in the manner prescribed by the Administrator and is					
<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <input type="checkbox"/> APPROVED <input type="checkbox"/> REJECTED </div> <div style="margin-right: 10px;">} BY {</div> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 33%;"> <input type="checkbox"/> CAA Designee <input type="checkbox"/> CAA Aviation Safety Agent </div> <div style="width: 33%;"> <input type="checkbox"/> Manufacturer <input type="checkbox"/> Repair Station </div> <div style="width: 33%;"> <input type="checkbox"/> Canadian Department of Transport Inspector of Aircraft <input type="checkbox"/> Other (Specify) </div> </div> </div>					
<div style="display: flex; justify-content: space-between;"> (Date of approval or rejection) (Signature of authorized individual; title or identification number) </div>					
7. TO BE COMPLETED ONLY BY CAA PERSONNEL					
a. <input type="checkbox"/> Forwarded for engineering comment <input type="checkbox"/> See attached memorandum					
b. <input type="checkbox"/> Accepted (Date) <input type="checkbox"/> Reinspected (Date) <input type="checkbox"/> Spot Checked (Date)					
<div style="display: flex; justify-content: space-between;"> (CAA designation number) (Signature Aviation Safety Agent) </div>					

16-54610-4

Form ACA-337 (4-52)

Reverse side of Form No. ACA 337

INSTRUCTIONS

This form must be completed in duplicate each time a major repair and/or alteration is made of an aircraft, airframe, powerplant, propeller or appliance. After the repair and/or alteration has been inspected and item 6 completed, the original copy of this form will be made available to the aircraft owner for retention as part of the aircraft records. The duplicate copy is retained by the CAA for administrative purposes.

See CAM 18 for detailed instructions concerning the information to be furnished with this form and instructions concerning its preparation.

8. DESCRIPTION OF WORK ACCOMPLISHED.*

FORM NO. AMO 4

The Daily Flight Record, Form No. AMO 4, is used by the Flight Department for checking aircraft out for flight, but is issued by the Aircraft Maintenance Department. Daily sheets are issued for those planes airworthy for flight. Aircraft due for repairs or inspections are withheld and no flight sheet issued until after repairs or inspections are completed. New Daily Flight Record Sheets are issued daily and the previous day's sheets are picked up, totaled, time logged in the aircraft and engine logbooks, and time on the Daily Status Sheet, Form No. AMO 5, changed by amount of time flown. Form No. AMO 5 is made up daily and used as a perpetual means of indicating when 25, 50, 75, and 100 hour inspections are due. This form is used only for University-owned aircraft.

UNIVERSITY OF ILLINOIS INSTITUTE OF AVIATION

DAILY FLIGHT RECORD Aircraft Make & Model _____ N _____ Date _____

FLIGHT STATUS TODAY

Preflighted by _____ Aircraft is airworthy _____

Aircraft is not airworthy due to: _____

AIRCRAFT FLIGHT AND OPERATIONS REPORT

Flt. No.	Name of Pilot and Passengers	Time Out	Time In	Flight Time	No. of Local Landings	Remarks
	Brought Forward					
1						
2						
TOTALS FOR THE DAY						
TOTALS TO DATE						

FORM NO. AMO 36

When material is received on a continuous order or by University stores voucher, the Storekeeper, by means of Material Receipt, Form No. AMO 36, notifies the Cardex Clerk so that the material may be properly cardexed and accounted for.

INSTITUTE OF AVIATION AIRCRAFT MAINTENANCE

MATERIAL RECEIPT

Rec'd from (Vendor) _____ on (P.O. or S.V.) _____

QUANTITY	PART NUMBER	DESCRIPTION

Date _____ Storekeeper _____

Above items entered on Cardex by _____

FORM NO. AMO 5

Form No. AMO 5 is made up daily and used as a perpetual means of indicating when 25, 50, 75, and 100 hour inspections are due. This form is used only for University-owned aircraft.

UNIVERSITY OF ILLINOIS INSTITUTE OF AVIATION									
AIRCRAFT DAILY STATUS SHEET								DATE _____	
Aircraft Number	Time Today	Total Ship Time	Engine Time Since O.H.	Time Since				Status Today	Work Order
				25 Hr.	50 Hr.	75 Hr.	100 Hr.		
Aeronca 82993									
Aeronca 82994									
Aeronca 82995									

FORM NO. AMO 27

This form is attached to the work orders covering extended repair jobs when several mechanics are needed for several days to complete the work. It is a labor record sheet which the mechanics sign in and out as they perform work on the particular work order specified.

UNIVERSITY OF ILLINOIS INSTITUTE OF AVIATION AIRCRAFT MAINTENANCE				
LABOR RECORD		Work Order Number AM _____		
EMPLOYEE	DATE	TIME		TOTALS
		On	On	
		Off	Off	
		On	On	
		Off	Off	
RATE _____		COST _____		TOTAL HOURS _____

FORM NO. AMO 28

This request for purchase form is issued primarily by the Storekeeper in notifying the Aircraft Maintenance Engineer of what items are getting low in the Stockroom or what items have been called for which are not carried in stock. The Aircraft Maintenance Engineer also uses this form in making up purchase requisitions.

UNIVERSITY OF ILLINOIS INSTITUTE OF AVIATION				
REQUEST FOR PURCHASES				Date _____
PREFERRED VENDOR	Name _____		Requested by _____	
	Street _____ City _____		Classification _____	
Quantity	Part No.	Description	Unit Cost	Total Cost
I have checked the above list of material and authorize purchase of same.				
				Head of Department _____

This is the official purchase requisition form used by the University of Illinois. The yellow copy is retained by the Aircraft Maintenance Engineer and the other copies are forwarded to the Director's office for final approval prior to forwarding to the Purchasing Division for issuance of the purchase order. Requisition number is entered in the Requisition-Purchase Order Ledger and then filed. Upon receipt of the requisition the Purchasing Division will, after contacting source of supply, issue a purchase order and receiving report. Upon receipt of purchase order it is entered in the Requisition-Purchase Order Ledger and then filed with the yellow requisition copy. The receiving report is forwarded to the Storekeeper who files it until material is received, at which time he checks items received, after checking and inspecting condition of received material. The receiving report is then forwarded to the Maintenance Office where it is checked against the purchase order, signed, and forwarded to the Purchasing Division to verify receipt of material.

The Cardex Clerk posts material received on the purchase orders onto the respective cards of the perpetual Cardex, and when invoice vouchers are received indicating payment has been made, the prices on the Cardex are checked and where necessary changed to agree with the more recent prices. The invoice voucher totals are then entered in the Requisition-Purchase Order Ledger and then filed by purchase order number along with the purchase order and requisition.

ORIGINAL
FOR BUSINESS OFFICE

Department Requisitioning _____ No. _____ DATE _____

TO THE PURCHASING AGENT:

Please Supply the Following at _____

	Room Number	Building
1. _____		
2. _____		
3. _____		
4. _____		
5. _____		
6. _____		
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97. _____		
98. _____		
99. _____		
100. _____		

Not Later Than _____ Call _____ Ext. _____ For additional information
(Name)

QUANTITY	CATALOG NUMBER	ITEM (Give Complete Specifications)	Estimated Cost (If Available)	Suggested Vendor	P. O. Number

APPROPRIATION

Expense Classification No. _____ { 2. Office expense 4. Supplies,
including repairs 6. Equipment
7. Land, Buildings

Requested by _____ In Charge	BUSINESS OFFICE	Received: _____
Approved _____ Dean or Adm. Officer	_____ Chief Accountant	
Approved _____	_____ Comptroller	
	_____ Director of Purchases	

FORM NO. AMO 9

This Inspection form is used on all 25 hr., 50 hr., and 75 hr. inspections on University of Illinois Aircraft and on oil change periods on customer aircraft. While the oil is draining a large part of this visual inspection can be completed. The form is always stapled to the work order when needed and upon completion is returned to the Maintenance Office where the Clerk makes the logbook entry and files the form in the specified aircraft inspection file.

UNIVERSITY OF ILLINOIS INSTITUTE OF AVIATION

25 HR. — 50 HR. — 75 HR. INSPECTION WORK SHEET

Date_____

A/C Make & Model_____ Eng. Make & Model_____

A/C Reg. No._____ Total A/C Time_____ Eng. Time Since O.H._____

MECHANIC INSTRUCTIONS

1. Make a visual inspection of aircraft particularly the primary structure and power plant sections.
2. Indicate whether airworthy or not by checking (✓) appropriate block.
3. Oil screen should be removed and checked on the 50 hr. and the first 25 hr. following engine overhaul.

PROPELLER GROUP

1. Check propeller for visible defects such as: Loose screws, tipping, nicks, bends, and protective finish.

REMARKS

YES

NO

MECH

POWER PLANT SECTION

1. Change oil, check for excessive oil leaks, re-safety drains and screens.
2. Check for induction leaks, fuel leaks, exhaust leaks, condition of baffling, heater hoses, carburetor heater, cabin heater.
3. Check engine mount and cowlings.
4. Check ignition leads.

WING AND CENTER SECTION

1. Check wings and center section for signs of damage such as wrinkles, bends, holes, loose fairing, and screws.
2. Check lift struts and brace wires.
3. Check movable surfaces and actuating mechanisms.

FUSELAGE GROUP

1. Check fuselage for visible signs of damage such as wrinkles, holes, bent members, loose fairing, and screws.

EMPENNAGE GROUP

1. Check fixed and movable surfaces for wrinkles, holes, misalignment, loose fairing, and screws.

LANDING GEAR GROUP

1. Check landing gear struts for damage and inflation.
2. Check tires for inflation and wear.
3. Check tail wheel and tire for wear and lubricate.
4. Check attachment and steering mechanism.

REMARKS**YES****NO****MECH****COCKPIT GROUP**

1. Check flight controls for proper movement and freedom.
2. Check engine and appliance controls.
3. Check instruments.

PREFLIGHT AND RUN UP

1. Run up and check engine, raise cowl and check for oil leaks.

SIGNATURE**CERTIFICATE NO. & RATING****TIME REQUIRED FOR INSP.**

For convenience in handling this form should be confined to a single page.

FORM NO. AMO 10

This is the 100 hr. and annual inspection form or worksheet. In the case of annual inspections, a Form No. ACA-319 is filled out in addition to the 100 hr. Inspection Work Form No. AMO-10. This form is stapled to the work order when required and is returned to the office with the completed work order, where the logbook entry is made and the form filed in the respective aircraft inspection file. AMO-10 will be countersigned by an inspector. Form ACA-319, when applicable, will remain in the aircraft and will be so placed by either the Aircraft Maintenance Engineer or the Shop Foreman along with the new Airworthiness Certificate.

UNIVERSITY OF ILLINOIS INSTITUTE OF AVIATION**100 HOUR INSPECTION WORK SHEET**

Date _____

A/C Make & Model _____ Eng. Make & Model _____

A/C Reg. No. _____ A/C Serial _____ Eng. Serial _____

Total A/C Time _____ Eng. Time Since O.H. _____

MECHANIC INSTRUCTION

1. Circle item when starting job and initial in mechanic column when completed.
2. Enter brief description of repairs, replacements, and adjustments in remarks column.
3. Draw a line through items which do not apply to this airplane or engine.
4. Indicate whether airworthy or not by checking (V) appropriate block.

ENGINE AND NACELLE GROUP

1. Oil system: Drain sump, clean screen, check hose clamps, rocker covers, push rod housings, oil tanks, oil lines, drain oil tank, check accessories for leaks.
2. Fuel system: Clean strainer, drain sumps, check induction system, check primer operation, check fuel lines.
3. Ignition system: Clean spark plugs, check wiring.
4. Exhaust system: Check stacks and manifold, check cabin heater, check carburetor heater, check engine breather.
5. Power plant controls: Check throttle control, mixture control, carburetor heat control, cowl flap control, oil shutter control.
6. Cooling system: Check baffling, check cowling, check cowl flaps.
7. Engine mount: Check attachment fittings, engine mount, shock mounts.
8. Engine accessories: Check magnetos, starter, generator, fuel pump, oil pump, propeller governor, vacuum pump, tachometer generator.

REMARKS**YES****NO****MECH****PROPELLER GROUP**

1. Check blades, hub, tipping, screws, attachment, control, track, spinner, accessories.

LANDING GEAR GROUP	REMARKS	YES	NO	MECH
<p>1. Main landing gear: Check struts and attachment fittings, hydraulic system, latches, retraction, gear warning, gear position indicator, axles, bearings, wheels, tires and tubes, brakes, brake lining, landing gear bolts.</p> <p>2. Nose or tail gear: Check tire and tube, wheel bearings, axle, attachment bolts, hydraulic system, steering mechanism, retraction.</p>				
FUSELAGE GROUP				
<p>1. Fuselage structure: Check truss, formers, skin or fabric, wing attachment fittings, landing gear fittings, external brace fittings.</p> <p>2. Control mechanism: Check cables, control horns, bell cranks, push-pull rods, pulleys, fairleads.</p> <p>3. Cargo compartments: Articles adrift, placards.</p> <p>4. Wiring and plumbing: Check wiring, check plumbing lines.</p>				
CABIN AND COCKPIT GROUP				
<p>1. Fuel system: Check fuel tank, fuel lines, shut-off valve, selector valve.</p> <p>2. Electrical system: Check wiring, battery, switches, lights, generator control, limit switches, warning devices.</p> <p>3. Hydraulic system: Check and service brake master cylinders, system reservoir, check lines, controls.</p> <p>4. Seats and safety belts: Check seats, seat attachment, safety belts, safety belt attachment, cushions.</p> <p>5. Flight controls: Check sticks or wheels, cables, sprockets, chains, pulleys, rudder pedals, actuating mechanisms, brake pedals.</p> <p>6. Power plant controls: Check throttle, propeller control, mixture control, carburetor heat, cabin heat, starter, cowl flaps, air conditioner, cabin ventilator.</p> <p>7. Windows, doors, and windshields: Check and clean glasses, check latches, locks, weather stripping, hatches.</p> <p>8. Instruments: Check instrument marking, pointer position, attachment, operation.</p>				

9. Certificates and placards: Check the following and note expiration date in proper space provided if applicable.

IN AIRCRAFT

	EXPIRATION DATE	YES	NO	CHECKED BY
A. Aircraft registration certificate.				
B. Aircraft airworthiness certificate.				
C. Radio license.				
D. Operation limitation or flight manual.				
E. Compass deviation card.				
F. State registration certificate.				

RADIO GROUP

1. Check receiver and transmitters for attachment, operation, check antennas, insulators.

WING — CENTER SECTION GROUP

1. Fixed surfaces: Check spars, ribs, drag and anti-drag wires, bow, trailing edge, fabric or skin.

2. Movable surfaces: Check ailerons, flaps, trim tabs.

3. Wing attachment: Check wing root fittings, strut fittings, and struts.

4. Electrical system: Check wiring, lights, limit switches.

5. Flight control mechanism: Check cables, bell cranks, push-pull rods, pulleys, fairleads.

6. Fuel system: Check fuel tanks, lines, sumps, filler caps, vents.

7. Hydraulic system: Check lines, actuating cylinders, fittings.

EMPENNAGE GROUP

1. Fixed surfaces: Check stabilizer, fin, tail brace wires, attachment fittings, fabric or skin, cables, pulleys.

2. Movable surfaces: Check elevator, rudder, tabs, actuating horns, push-pull rods, control mechanisms, fabric or skin, attachment fittings.

3. Electrical system: Check electrical wiring, lights.

MISCELLANEOUS GROUP

1. Pitot static system: Check lines and couplings, pitot head, static opening.

2. Position light flasher: Check operation, monitor light and switch.

3. Flare installation: Check wiring, mounting bracket, ejection opening.

REMARKS

YES

NO

MECH

THE FOLLOWING SPECIFICATIONS, ADS, AND SERVICE NOTES WERE CHECKED AND COMPLIED WITH AT TIME OF THIS INSPECTION OR PREVIOUSLY (INDICATE WHICH)

Specification Notes	ADS Notes	Service Notes	This Inspection	Previous	Mech

Pre-flight Inspection: Airworthy _____ Unairworthy _____ Mech _____
IT IS CERTIFIED THAT THIS AIRCRAFT HAS BEEN THOROUGHLY INSPECTED, AS REQUIRED BY CIVIL AIR REGULATIONS, AND FOUND TO BE AIRWORTHY.

SIGNATURE (S)	CERTIFICATE NO. (S) & RATING (S)	DATE

ENTERED IN LOG BOOK ☐

THE INSTITUTE OF AVIATION, established in 1945 as the Institute of Aeronautics, is operated as the administrative agency responsible for the fostering and correlation of the educational and research activities related to aviation in all parts of the University. Other functions include academic instruction, flight training, management of the University of Illinois Airport, and aeronautical research.

In connection with the latter function, the Institute issues two types of publications . . . first, a group of reports on research results, and second, a series of bulletins on aviation subjects of an extension-service nature to the citizens of the State.

The following publications have been issued:

- BULLETIN ONE:** Municipal Airport Management, Leslie A. Bryan, 1947. (Out of print)
- BULLETIN TWO:** Landscape Planting for Airports, Florence B. Robinson, 1948.
- BULLETIN THREE:** Labor Relations in the Air Transport Industry Under the Amended Railway Labor Act, E. B. McNatt, 1948.
- BULLETIN FOUR:** Airport Zoning, J. Nelson Young, 1948. (Out of print)
- BULLETIN FIVE:** Evaluation of the School Link as an Aid in Primary Flight Instruction, A. C. Williams, Jr. and Ralph E. Flexman, 1949.
- BULLETIN SIX:** Lightplane Tires on Turf and Concrete, Leslie A. Bryan, 1949.
- BULLETIN SEVEN:** Light Aircraft Operating Costs, Leslie A. Bryan, 1949.
- BULLETIN EIGHT:** Evaluation of the School Link and Special Methods of Instruction in a Ten-Hour Private Pilot Flight-Training Program, Ralph E. Flexman, William G. Matheny, and Edward L. Brown, 1950. (Out of print)
- BULLETIN NINE:** Flight by Periscope: I. Performing an Instrument Flight Pattern; the Influence of Screen Size and Image Magnification, Stanley N. Roscoe, 1951.
- BULLETIN TEN:** Operating Costs of a Light Aircraft Fleet, Leslie A. Bryan, 1952.
- BULLETIN ELEVEN:** 180-Degree Turn Experiment, Leslie A. Bryan, Jesse W. Stonecipher, and Karl Aron, 1954.
- BULLETIN TWELVE:** Aviation Ground School, Leslie A. Bryan, 1954.
- BULLETIN THIRTEEN:** Organizing for Flight Operations, Leslie A. Bryan, 1954.
- BULLETIN FOURTEEN:** Developing an Aircraft Maintenance Curriculum, Leslie A. Bryan, 1955.
- BULLETIN FIFTEEN:** Airport Shop Operations, Leslie A. Bryan, 1955.

Publications of the Institute of Aviation will be sent free of charge upon request.

UNIVERSITY OF ILLINOIS-URBANA



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